1. NAME OF PROPERTY

Historic Name: Fresno Sanitary Landfill

Other Name/Site Number:

2. LOCATION

Street & Number: West and Jensen Avenues Not for publication:

City/Town: Fresno Vicinity:

State: CA County: Fresno Code: 019 Zip Code: 93706

3. CLASSIFICATION

Ownership of Property		Category of Property	
Private:	___	Building(s):	
Public-Local:	X	District:	
Public-State:	___	Site:	
Public-Federal:	___	Structure:	X
		Object:	

Number of Resources within Property

Contributing	Noncontributing	
___	___	buildings
___	___	sites
1	___	structures
___	___	objects
1	0	Total

Number of Contributing Resources Previously Listed in the National Register:

Name of Related Multiple Property Listing:

4. STATE/FEDERAL AGENCY CERTIFICATION

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this ____ nomination ____ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ____ meets ____ does not meet the National Register Criteria.

_____ _____
Signature of Certifying Official Date

_____
State or Federal Agency and Bureau

In my opinion, the property ____ meets ____ does not meet the National Register criteria.

_____ _____
Signature of Commenting or Other Official Date

_____
State or Federal Agency and Bureau

5. NATIONAL PARK SERVICE CERTIFICATION

I hereby certify that this property is:

___ Entered in the National Register
___ Determined eligible for the National Register
___ Determined not eligible for the National Register
___ Removed from the National Register
___ Other (explain): _____

_____ _____
Signature of Keeper Date of Action

6. FUNCTION OR USE

Historic: Government Sub: Public works

Current: Government Sub: Public works

7. DESCRIPTION

Architectural Classification: Other: Sanitary Landfill

Materials: Earth

Foundation:
Walls:
Roof:
Other: Earth

Describe Present and Historic Physical Appearance.

The Fresno Sanitary Landfill (FSL) is located three miles southwest of the City of Fresno, Fresno County, California at an elevation of approximately 265 feet above sea level. It is situated in the eastern San Joaquin Valley, approximately 20 miles southwest of the foothills of the Sierra Nevada Mountains and approximately 10 miles south of the San Joaquin River.

The landfill is bounded on the north by Jensen Avenue (actually a few hundred feet south), on the east by West Avenue, on the south by North Avenue, and on the west by agricultural fields beyond which is Marks Avenue. The area surrounding the landfill is flat (the natural topography is characterized by low relief at the site with slopes ranging from 0.9 to 1.9%) and primarily surface-irrigated agricultural land, with a few residences adjacent to the northern and southern boundaries.[1]

The total area of city-owned property where the landfill is located encompasses an area of more than 290 acres. The landfill itself covers an area of approximately 140 acres, and is the parcel nominated for landmark status.[2] The FSL is rectangular in shape with a length of about 4,200 feet in a north-south direction and a width of about 1,250 feet along its east-west axis. Refuse has been placed to a height of from 45 to 60 feet above the surrounding grade within trenches dug lengthwise at the landfill site of about 20 to 24 feet in width each. The first trench was filled with wastes from arriving trucks, leveled, and then compacted. A second trench is dug and its dirt is used as an earthen cover for the adjacent trench filled with refuse. The dirt is then compacted on top of the refuse, and the process begins again: refuse dumped into a trench, dirt from a new trench covers the refuse, and so forth. The refuse prism extends to about 25 to 35 feet below the surrounding grade. However, in the earliest days of the landfill the prism only extended 10 to 12 feet below grade. (The location where the grades converged inward was the area last filled, but due to closure it was never completely filled.) Side slope gradients range from ten horizontal to one vertical (10:1) on the east side, and as steep as 2:1 on the west side. The top surface has a flat gradient of approximately 30:1, sloping outward from the center with exception of a small (approx. 200' by 400') area in the middle of the landfill where gradients converge inward. Groundwater depth varies between 52 and 59 feet below the surface. The landfill cover soils consist of dense, orange-brown silty sand in which sparse native grasses took hold, but grading along the top of the landfill in 1992 resulted in large portions of landfill being without vegetation. The photographs provided with this nomination show the top and side of the landfill with random patches of grasses and large areas of compacted soil.[3]

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[1]The FSL is located precisely in the eastern half of Township 14S, Range 20E, Section 19 (Mount Diablo and Meridian). See Camp Dresser & McKee, Inc., City of Fresno: Fresno Sanitary Landfill: Remedial Investigation Report, Final (Walnut Creek, CA: Camp Dresser & McKee, Inc., May 20, 1994), 1-3 to 1-5; U.S. Environmental Protection Agency, Fresno Sanitary Landfill: Superfund Site, Removal Action No. 1 (U.S. EPA. Region IX, n.d.).

[2]GeoSyntec Consultants, Final Remedial Action Work Plan: Construction and Operations Activities for Operable Unit 1: Fresno Sanitary Landfill, Fresno, California (Walnut Creek, CA: GeoSyntec Consultants, March 3, 1999), 1-1; GeoSyntec Consultants, Design of Source Control Operable Unit: Fresno Sanitary Landfill, Fresno, California Volume I: Design Report (Walnut Creek, CA: GeoSyntec Consultants, March 24, 1997), 1-2; Camp Dresser & McKee, Inc., City of Fresno: Fresno Sanitary Landfill: Remedial Investigation Report, Final, 1-3.

[3]Camp Dresser & McKee, Inc., City of Fresno: Fresno Sanitary Landfill: Remedial Investigation Report, Final, 1-3; Camp

Unconsolidated alluvial sediments composed of silt, sand, clay, and gravel originating in the Sierra Nevada Mountains to the east, underlie the landfill and are several thousand feet in thickness. Below these sentiments are older Tertiary sedimentary rocks which overlay igneous basement rocks. The total sedimentary thickness in the vicinity of the landfill is over 24,000 feet.[4]

Fresno Colony Canal passes close to the east edge of the landfill supplying irrigation water to area farmers. The canal is unlined in the vicinity of the FSL, but a concrete water supply pipeline bisects the fill in an east-west direction along the approximate alignment of Annadale Avenue. The pipeline is 18 inches in diameter and placed below the landfill solid waste just below the surrounding grade elevation, and terminates just west of the west fill boundary.[5]

Between the opening in 1937 and its close in 1987, the FSL accepted municipal solid waste (MSW) from the City of Fresno. While the wastestream composition varied over the years as packaging styles and the material use changed, the MSW likely included materials such as food waste, paper and packaging materials, metal containers, glass, rubber, wood, leather, plastics, and some household cleaning chemicals, pesticides and herbicides, and automobile battery boxes.[6] The landfill was also open to the public for the disposal of tree trimmings and a variety of rubbish (inorganic materials). The overall average total waste stream at the FSL consisted of approximately 16,500 tons of MSW per month. The total waste quantity in-place is between 4.7 and 8.0 million tons or 7.9 million cubic yards.[7]

No records were kept on the types of waste accepted (hazardous or otherwise), other than billing receipts. City trucks, however, were seen disposing of petroleum products and solvents in the landfill. Records indicate that from the late 1950s to the mid-1960s, the FSL received battery acid that reportedly was regularly disposed of twice a week by 1,600 gallon tank trucks from a smelter supply company, a division of NL Industries.[8] According to an Emcon report, the FSL also accepted approximately 500 pounds of waste per day from local convalescent homes and from the Fresno Dialysis Center, with the approval of the County Health Department. However, the time period is not known for this dumping practice.[9]

Dresser & McKee, Inc., Investigation and Feasibility Study for Fresno Sanitary Landfill (Walnut Creek, CA: Camp Dresser & McKee, Inc., 1990), 1; Jim Martin, e-mail message to author, March 12, 2000.

[4]U.S. Environmental Protection Agency, Fresno Sanitary Landfill: Superfund Site, Removal Action No. 1, 2. For more detail on the geology of the region, see Earth Sciences Associates, Phase I: Geologic and Hydrogeologic Investigation of the Fresno Landfill (Palo Alto, CA: Earth Sciences Associates, December, 1998).

[5]Camp Dresser & McKee, Inc., City of Fresno: Fresno Sanitary Landfill: Remedial Investigation Report, Final, 1-4.

[6]For types and amounts of typical materials disposed of by residential and commercial customers in the United States, see Martin V. Melosi, Garbage in the Cities: Refuse, Reform, and the Environment, 1880-1980 (College Station, TX: Texas A&M University Press, 1981), 23-24, 194; Melosi, The Sanitary City, 398.

[7]Camp Dresser & McKee, Inc., Final Administrative Order No. 90-24: Sampling and Analysis Plan for Fresno Sanitary Landfill, Fresno, California (Walnut Creek, CA: Camp Dresser & McKee, Inc., July 12, 1991), 2-1; Camp Dresser & McKee, Inc., Investigation and Feasibility Study for Fresno Sanitary Landfill, 2-3; (GeoSyntec Consultants, Final Remedial Action Work Plan: Construction and Operations Activities for Operable Unit 1: Fresno Sanitary Landfill, Fresno, California, 1-2; Jim Martin, e-mail message to author, March 12, 2000.

[8]U.S. Environmental Protection Agency, Fresno Sanitary Landfill: Superfund Site, Removal Action No. 1, 3; Camp Dresser & McKee, Inc., City of Fresno: Fresno Sanitary Landfill: Remedial Investigation Report, Final, 1-8.

[9]Camp Dresser & McKee, Inc., Investigation and Feasibility Study for Fresno Sanitary Landfill, 2.

The FSL contained no liners, containment structures, leachate collection systems, or leak detection systems upon its original construction. In subsequent investigations, leading to and after its closure, at least 20 hazardous substances were found in the groundwater at the site, including volatile organic compounds (VOCs) such as vinyl chloride (at levels exceeding federal and state action levels) and trans-1, 2-dichloroethene. There also was a migration of methane off-site indicating high concentrations of methane gas production within the landfill.[10]

Historical Integrity

The operation began in the north section of the landfill in 1937. In its early years of operation, the FSL was primarily located north of Annadale Avenue. The city expanded the landfill to south of Annadale in 1945. The original 20 acre site had been expanded several times. In 1966, the site was 100 acres (the exact maximum size then allowed for a detached annexation). In 1969, the city acquired additional land extending down North Avenue, bringing the landfill to its present size of 140 acres. In 1977-78, the city continued to operate its landfill after negotiations for use of a privately owned site, initiated by private interests, proved unsuccessful.[11] The FSL officially closed on June 30, 1987, as the nation's oldest operating landfill with a closure ceremony attended by 75 people.[12]

Changes in federal law, especially after 1970, placed much higher environmental standards on landfills than those considered in the 1930s and 1940s. The Resource Conservation and Recovery Act (RCRA), passed in 1970 and subsequently expanded, gave the Environmental Protection Agency extensive regulatory authority over municipal solid waste, particularly in the design and operation of landfills and incinerators. Under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), which established the Superfund program, landfills were subject to stricter regulation and financial liability. The 1984 amendments, in particular, attempted to tighten standards with respect to landfills.[13]

The FSL was first evaluated by the Superfund program as a result of a notification filed by the City of Fresno Solid Waste Management Division on May 27, 1981. The city began the process of closing the landfill by filing a Negative Declaration with the California Regional Water Quality Control Board in August, 1981. The problem of methane gas was first identified in June 1983 when Fresno City Public Works Department and the County Health Department conducted a preliminary investigation using portable equipment. The California Department of Health Services conducted a preliminary inspection of the site in June, 1984 in response to complaint letters from nearby residents. (An intermediate Assessment had determined that off-site migration of methane gas and a variety of volatile organic

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[10]Administrative Consent Order in the Matter of Fresno Sanitary Landfill, City of Fresno, U.S. EPA Docket No. 90-22 (n.d.), 5- 6; U.S. Environmental Protection Agency, Fresno Sanitary Landfill: Superfund Site, Removal Action No. 1, 2-3.

[11]GeoSyntec Consultants, Final Remedial Action Work Plan: Construction and Operations Activities for Operable Unit 1: Fresno Sanitary Landfill, Fresno, California, 1-2; U.S. Environmental Protection Agency, Fresno Sanitary Landfill: Superfund Site, Removal Action No. 1, 3; Jim Martin, e-mail message to author, March 9, 2000.

[12]Irwin Speizer, "Dump Closes a Long Career," Fresno Bee, July 1, 1987, A1.

[13]Martin V. Melosi, "Historic Development of Sanitary Landfills and Subtitle D," Energy Laboratory Newsletter 31 (Spring 1994): 22-23.

chemicals in the groundwater had been documented.)[14] On October 4, 1989, the site was placed on the National Priorities List of Superfund Sites as defined in Section 105 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).[15]

Since the landfill closure in 1987, some modifications to the site have occurred, including the addition of one water well in the west-central portion of the landfill, and a second water well in the east-central portion of the fill. A vacuum system on the methane barriers was installed by the city sometime between September, 1990 and August, 1991. More recently, a weighing scale and scale house were removed, and the two water wells were filled in and destroyed.[16] Over the course of the years, the landfill was subject to several investigations of ground water contamination.[17]

In March, 1999, the Fresno City Council voted to request bids to convert a portion of the overall landfill site into a sports complex, calling for nine full-size soccer field, six smaller soccer fields, six full-size softball fields, and a lake approximately 300 by 100 yards and 18 to 20 feet deep. These features were

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[14]An initial methane monitoring system consisting of 17 methane-monitoring wells was installed, expanded to 24 as part of further investigations. In November 1984, the city installed methane migration barriers along the northern and southern boundaries of the landfill (Barriers are trenches 26 feet deep, containing a vertical sheet of plastic and filled with rock; trenches have two horizontal perforated poly vinyl chloride pipes at depths of 12 and 19 feet venting to the surface.)

[15]On September 19, 1990 the United States Environmental Protection Agency (EPA) issued Administrative Order No. 90-19 directing the city to apply a vacuum to the existing methane barriers and to develop a system for controlling gas over the entire site (this was modified on February 15, 1991, eliminating the requirement to install a facility gas control system). Also in 1990, the EPA's Technical Assistance Team sampled soil gases beyond the methane barriers for VOCs. Methane and VOCs were detected in soil gas samples collected in 1991, 1992, and 1993 to maximum distances of 500 feet (methane) and 1,000 feet (VOCs) from the landfill perimeter. Beginning in 1994, a subsurface and geologic evaluation was performed as part of the predesign investigation for the future closure of the FSL in order to evaluate the existing cover conditions. GeoSyntec Consultants, Final Remedial Action Work Plan: Construction and Operations Activities for Operable Unit 1: Fresno Sanitary Landfill, Fresno, California, 1-2 to 1-3. See also Camp Dresser & McKee, Inc., Final Administrative Order No. 90-24: Sampling and Analysis Plan for Fresno Sanitary Landfill, Fresno, California, 2-2 to 2-3; Administrative Consent Order in the Matter of Fresno Sanitary Landfill, City of Fresno, U.S. EPA Docket No. 90-22, 5-6. For more on the methane barrier, see Camp Dresser & McKee, Inc., Fresno Sanitary Landfill: South Methane Barrier System: Start-Up (Walnut Creek, CA: Camp Dresser & McKee, Inc., November 3, 1991), 1; Camp Dresser & McKee, Inc., Fresno Sanitary Landfill, Administrative Order (Docket No. 90-19): Methane Barrier Vacuum System Plan (Walnut Creek, CA: Camp Dresser & McKee, Inc., November 15, 1990), 1-2; Camp Dresser & McKee, Inc., City of Fresno: Fresno Sanitary Landfill: Remedial Investigation Report, Final, 1-4.

[16]Subsurface methane barriers (trenches) exist just outside the north and south ends of the landfill and have related aboveground PVC piping and blower stations. The barrier to the north is 400 feet in length and the one to the south is 650 feet Camp Dresser & McKee, Inc., City of Fresno: Fresno Sanitary Landfill: Remedial Investigation Report, Final, 1-4; Camp Dresser & McKee, Fresno Sanitary Landfill, Administrative Order (Docket No. 90-19): Methane Barrier Vacuum System Plan (Walnut Creek, CA: Camp Dresser & McKee, Inc., November 15, 1990), 1.

[17] BSK and Associates provided initial assessment of groundwater contamination and methane migration in 1983. Six groundwater monitoring wells ("W" series) were installed around the perimeter of the FSL; in 1987 they installed more wells ("UW" and "DW" series) around the perimeter and drilled temporary boreholes for sampling groundwater. Kenneth D. Schmidt and Associates installed and developed a pilot extraction/pumping well (EW1) near the southwest corner of the landfill to investigate aquifer characteristics at the site in 1987. Earth Sciences was retained by the city in 1988 to refine and expand a geologic and groundwater database at the site. They installed an observation well (OW1) and more monitoring wells (MW series) adjacent to the FSL. Camp Dresser & McKee, Inc., Investigation and Feasibility Study for Fresno Sanitary Landfill, 4-5. For additional 1989 studies see Camp Dresser & McKee, Inc., City of Fresno: Fresno Sanitary Landfill: Remedial Investigation Report, Final, 1-10 to 1-13. For more detail on the range of investigations, see Camp Dresser & McKee, Inc., Revised Final Remedial Investigation and Feasibility Study Work Plan for Fresno Sanitary Landfill, Fresno, California (Walnut Creek, CA: Camp Dresser & McKee, Inc., July 24, 1991), 2-4.

to be added to the city-owned land encompassing the landfill-outside the proposed boundary of the historic designation--but not on the landfill proper.[18] As part of this project, the landfill mound itself will receive an additional 4 to 5 feet of covering (less than 10 percent of its current height). This will begin with a 24-inch layer of soil and waste material covered by a flexible membrane designed to prevent water from getting garbage and to control landfill gas movement. An outermost 33-inch layer of soil and vegetation will top off the mound.[19]

[18] Mark S. Arcamonte, "Landfill Plans Call for Change from Superfund Site to Soccer Fields," Fresno Bee, March 18, 1999, 1, 4. See also, Mark Grossi, "Fresno Looks at Turning Former Landfill into a Park," Fresno Bee, September 15, 1997, A1, A10; EPA, "EPA Enters Agreement with Fresno," Fresno Sanitary Landfill Superfund Site (Region IX, San Francisco, California, June, 1998), 3.

[19] EPA, "EPA and City of Fresno Start Construction of the Landfill Cap and Early Groundwater Cleanup Action," Fresno Sanitary Landfill Superfund Site (Region IX, San Francisco, California, June, 1999), 2.

8. STATEMENT OF SIGNIFICANCE

Certifying official has considered the significance of this property in relation to other properties:
Nationally: X Statewide:__ Locally:

Applicable National Register Criteria: A X B__ C X D

Criteria Considerations (Exceptions): A__ B__ C__ D__ E__ F__ G

NHL Criteria: I & IV

NHL Theme(s): VI.Expanding Science and Technology
2. Technological Applications
VII. Transforming the Environment
3. Protecting and Preserving the Environment

Areas of Significance: Community Planning and Development, Engineering, Health/Medicine

Period(s) of Significance: 1937-1950

Significant Dates: 1937

Significant Person(s): N/A

Cultural Affiliation: N/A

Architect/Builder: Jean L. Vincenz (Engineer)

Historic Contexts: XVIII. Technology (Engineering and Invention)
L. Fire, Safety, Sanitation, and Pollution Controls
XXX. American Ways of Life
G. Consumer Society of the 20th Century

State Significance of Property, and Justify Criteria, Criteria Considerations, and Areas and Periods of Significance Noted Above.

The Fresno Sanitary Landfill (FSL) was opened in 1937 and closed in 1987. It is the oldest "true" sanitary landfill in the United States, and the oldest compartmentalized municipal landfill in the western United States, holding the service record of more than fifty years of continuous operation.[20] It is the first landfill to employ the trench method of disposal (discussed below) and the first to utilize compaction (also discussed below). In the strictest sense, New York City "compartmentalized" its refuse by placing it in deep holes and then covering the holes with dirt. But the layering of refuse and dirt in trenches, compacting the dirt and refuse, and then covering the filled areas daily to minimize rodent and debris problems represented the technique adopted by the builders of modern sanitary landfills, and thus represented a "true" sanitary landfill, not simply a modification on older land-dumping methods. The FSL, according to an EPA report, "was a substantial improvement over the accepted methods of sanitary waste disposal at the time and a model for other landfills around the country."[21]

As the standard practices of land and water dumping drew increased criticism in the late-nineteenth and early-twentieth centuries, engineers and sanitarians looked to a variety of alternatives to dispose of municipal solid wastes. They not only considered incineration and similar technologies to reduce or convert solid wastes to less voluminous amounts, but they gave renewed consideration to some of the older methods, such as using solid waste for filling low spaces and simply burying those wastes. They came to understand that these older methods, if properly managed, could be effective.[22] The practice of using waste for fill had been practiced for many years as a supplementary means of dealing with ashes and rubbish, and sometimes garbage. The use of organic wastes alone to fill ravines or to level roads was regarded as highly objectionable because it would putrefy and then smell. When garbage was mixed with large amounts of other materials, the practice was more acceptable, but rarely provided an adequate means for cities to dispose of all of their refuse. Landfilling never supplanted dumping on vacant land as a primary disposal method in this period, but remained an alternative for dealing with inorganic materials.

The "sanitary landfill" was the breakthrough that ultimately elevated the practice of filling to the status of primary disposal option in the United States until the late 1970s or 1980s. However, it did not come into substantial use until after World War II, stimulated in large measure by the success of the Fresno Sanitary Landfill and the work of its originator Jean Vincenz.[23]

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[20]NHL criterion exception 8 (regarding the eligibility of properties less than 50 years old) is determined to be not applicable in this case. The period of national significance is 1937 to 1950, the date of initial operation to the approximate date through which the Fresno Sanitary Landfill can be regarded as representing the leading edge of refuse disposal practices. By design, the landfill was intended to expand in height and length until the conclusion of its operational life in 1987.

[21]U.S. Environmental Protection Agency, Fresno Sanitary Landfill: Superfund Site, Removal Action No. 1, 3. See also GeoSyntec Consultants, Final Remedial Action Work Plan: Construction and Operations Activities for Operable Unit 1: Fresno Sanitary Landfill, Fresno, California, 1-2; Camp Dresser & McKee, Inc., Final Administrative Order No. 90-24: Sampling and Analysis Plan for Fresno Sanitary Landfill, Fresno, California, 2-1.

[22]Rudolph Hering and Samuel A. Greeley, Collection and Disposal of Municipal Refuse (New York: McGraw-Hill, 1921), 257.

[23]See Harry R. Crohurst, "Municipal Wastes: Their Character, Collection, and Disposal," Public Health Service Bulletin 107 (October 1920): 43-45; H. deB Parsons, The Disposal of Municipal Refuse (New York: John Wiley and Co., 1906), 78-80; D.C. Faber, "Collection and Disposal of Refuse," American Municipalities 30 (February 1916): 185-86; Robert

Early attempts at sanitary fill were tried at Seattle, New Orleans, and Davenport, Iowa as early as the 1910s, but they were little more than land-based dumps and did not represent systematic or large-scale disposal using the methods that would become more popular after World War II. The modern practice began in Great Britain in the 1920s under the name "controlled tipping." However, London and cities in the vicinity simply were dumping wastes between houses and covering the piles with street sweepings, rather than taking the refuse to a special location and alternately layering the waste and dirt as in modern sanitary fills. The American equivalents to the British practice appeared in the 1930s in New York City, San Francisco, and Fresno, California. In New York, as mentioned above, refuse was placed in deep holes primarily in marshes and then the holes were covered with dirt. In San Francisco, layers of refuse were deposited in tidelands to produce additional land, but actual trenches were not dug. Fresno□s trench system with compaction, thus, was the most unique and most typical of modern landfill construction.[24]

Sanitary landfilling was a promising land disposal technology that combined features of filling and open dumping. To some authorities this method was initially regarded as nothing more than glorified open dumping, criticized it as labor-intensive, unsafe, and unsanitary. The idea of a "sanitary" fill was intriguing to several other experts, however, because of its promise to deal with a wide array of refuse and the potential economy of the disposal method.[25]

The man most responsible for developing, implementing, and disseminating the sanitary landfill in the United States was Jean Vincenz (1894-1989), who served as commissioner of public works, city engineer, and manager of utilities in Fresno, California from 1931 to 1941. Born in Enfield, Illinois, he completed high school and attended junior college in Fresno. He received a degree in civil engineering at Stanford University in 1918 and a degree in public administration from San Diego State College in 1958. After resigning from his positions in Fresno, he became assistant chief of the Repairs and Utilities Division of the Army Corps of Engineers headquarters in Washington, D.C. (1941-47), and then served as public works director of the San Diego County Public Works Department (1947-62). In 1960, he was named president of the American Public Works Association.[26]

When Vincenz became commissioner of public works in Fresno, he recommended not renewing the franchise of the Fresno Disposal Company, which operated an incinerator. Vincenz considered it little more than □a dutch

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H. Wild, "Modern Methods of Municipal Refuse Disposal," American City 5 (October 1911): 207-208.

[24]Melosi, Garbage in the Cities, 168; Melosi, "Historic Development of Sanitary Landfills and Subtitle D," Energy Laboratory Newsletter 31 (1994): 20; Ellis L. Armstrong, Michael C. Robinson, and Suellen M. Hoy, eds., History of Public Works in the United States, 1776-1976 (Chicago: American Public Works Association, 1976), 449-50; "An Interview with Jean Vincenz," Public Works Historical Society Oral History Interview 1 (Chicago: Public Works Historical Society, 1980), 9-10; John J. Casey, "Disposal of Mixed Refuse by Sanitary Fill Method at San Francisco," Civil Engineering 9 (October 1939): 590-92. See also "A Five-Year Plan on Sanitary Fills," Engineering News-Record 123 (August 3, 1939): 159; Craig E. Colten, "Chicago's Waste lands: Refuse Disposal and Urban Growth, 1840-1990," Journal of Historical Geography 20 (1994): 133-34.

[25]See Rachel Maines and Joel Tarr, "Municipal Sanitation: Assessing Technological Cost, Risk and Benefit," (Case study, Carnegie-Mellon University, December, 1980), 16; -----Bounds, "Refuse Disposal in American Cities,"----------, 431-32.

[26]"An Interview with Jean Vincenz," 1.

oven,□ of which the city had received many complaints. He favored public administration of collection and disposal of solid waste. Prior to developing his sanitary fill in Fresno, he studied British controlled tipping techniques, visited several California cities (including Berkeley, which utilized a fill on the mud flats of the bay), and consulted with a New York engineer active in developing its sanitary fill. He came to believe that a true sanitary landfill required different elements than those utilized elsewhere, especially systematic construction of refuse cells, a deeper cover of dirt between layers of refuse, and compaction of both the earth cover and the waste. The trench system and compaction ultimately employed at Fresno distinguished the FSL as a prototype for modern sanitary landfills[27]

The initial sanitary landfill in Fresno, an experimental or demonstration fill, was opened on October 15, 1934, at the City Sewer Farm on Jensen Street, west of Cornelia Avenue, approximately three miles west of the nominated property. It was situated on a flat field several hundred feet from the main road. An option had been obtained by the city for a 120-acre plot of farm land within two miles of the city limits. A petition filed with the city commission complained about the possible negative effects of the dumping, and thus the option lapsed and the sewer farm site was selected. (While the City Sewer Farm now extends over 2,000 acres and is the site of the Fresno-Clovis regional wastewater disposal facility, the exact location of the original landfill cannot be confirmed. The site of the experimental or demonstration fill was neglected presumably because of the priority given to sewerage treatment at the City Sewer Farm and later under the authority of the Fresno-Clovis regional wastewater facility. No effort was made to retain the landfill's integrity for this reason and because a new site had been selected for the landfill. On the contrary, the nominated property had been obtained exclusively for use as a sanitary landfill, based on Vincenz's original concepts at the Sewer Farm, and was regarded as the city's primary solid waste disposal facility. That it operated as such until its closure in 1987, utilizing the innovative technology that Vincenz developed, and that the site has maintained a high historical integrity, makes a strong case for its designation as opposed to the experimental site.[28]

Vincenz was the first to use the "trench" or "cut and cover" ("fill and cover") method in the United States. As he described the technique.

> A ramp was constructed running up to 3 or 4 feet in height by digging a ditch or trench 3 feet or more in depth and piling the dirt to form the ramp at one side. The trench was from 20 to 24 feet in width and the ramp was wide enough to allow the trucks to swing and back up to dump their loads into the trench.[29]

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[27]"Sanitary Landfill and the Decline of Recycling as a Solid Waste Management Strategy in American Cities," ----------, 19-21; "An Interview with Jean Vincenz;" Jean L. Vincenz, "Sanitary Fill at Fresno," Engineering News-Record 123 (October 26, 1939): 539-40; Vincenz, "The Sanitary Fill Method of Refuse Disposal," Public Works Engineers' Yearbook (1940), 187-201; Vincenz, "Refuse Disposal by the Sanitary Fill Method," Public Works Engineers' Yearbook (1944), 88-96; "The Sanitary Fill as Used in Fresno," American City 55 (February 1940): 42-43; Melosi, "Historic Development of Sanitary Landfills and Subtitle D," 20.

[28]Vincenz, "The Sanitary Fill Method of Refuse Disposal," 187-8, 193; "The Sanitary Fill as Used in Fresno," 42. Jim Martin, e-mail message to author, March 9, 2000.

[29]Vincenz, "The Sanitary Fill Method of Refuse Disposal," 188.

Initially, operations involved a 1/2 yard track-laying dragline with a steel bucket hanging from a boom about 40 feet in length.[30] As Vincenz continued to explain:

> a chain laid on the bottom of the truck is pulled by the shovel to move a false tail gate which slides the garbage into the trench...The shovel then levels off the garbage and compacts it by dropping the bucket on the pile of garbage. Then we are ready to begin covering. A second trench is dug parallel to the first trench and adjacent to it,...and the dirt from the second trench is spread on top of the garbage and is compacted by allowing the bucket to drop on top of the earth covering. The depth of the garbage in these first and second trenches was increased to continue the slope of the ramp until a depth of about 8 feet of garbage was reached. The fill was then leveled off...[A] compacted and settled cell of garbage is about 6 feet in depth.[31]

The trenches and the compaction process, along with the daily covering of the fill, were the unique features of the sanitary landfill in Fresno, although Vincenz argued that compaction was the more important of the two. No one had ever emphasized compaction of the earth cover and the waste itself before Vincenz. In England, he stated, "cities had just dumped the refuse and put the street sweepings on it." In New York, they dug deep holes of from 10 to 15 feet deep in marshy areas and filled them with refuse and "casually cover the hole over and go on." In Berkeley, they were conducting disposal by fill similar to New York by filling tidelands to make an airfield (although the filled area proved too unstable to successfully maintain a usable airfield), and using street sweepings (which could include manure and other wastes) for the top of the fill instead of a real cover. As a result rats infested the area and to Vincenz's thinking, without compaction and without a real cover (ranging in depth from 12 to 24 inches) you would attract rats and thus could not claim to have a "sanitary" landfill.[32]

The 2 "1/2 years of operation at the sewer farm site was considered a success. Vincenz and his crew planted trees at the site and generally attempted to keep the area clean. The Fresno Waste Disposal Department encouraged visitors and attracted classes of school children, engineers, city managers, and other city officials to examine the operation. However, the experimental facility was not large enough to accommodate the waste of Fresno for a long period of time, and most importantly, Vincenz was concerned that the property was too far from Fresno to make transportation costs affordable. Vincenz, therefore, sought a more permanent site for his landfill closer to downtown Fresno. Through newspaper advertisement and by contacting real estate agents, bids were received on seven or eight different parcels of land. Appraisals soon followed. A 90-acre parcel three miles from city hall was purchased in 1937, which became the Fresno Sanitary Landfill. At this point the city began filling 4 1/3 acres per year with approximately 24,000 tons of mixed refuse--5,500 tons per acre--at a cost of 24 cents per ton.[33]

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[30]"The Sanitary Fill as Used in Fresno," 42.

[31]Vincenz, "The Sanitary Fill Method of Refuse Disposal," 188-89.

[32]The experience in Fresno indicated that rats would not burrow through more than six inches of earth, the amount Vincenz employed, but not necessarily so in other cities. See "An Interview with Jean Vincenz," 9-11; "The Sanitary Fill as Used in Fresno," 43. Jim Martin, e-mail message to author, March 12, 2000.

[33]"City Seeks New Site for Waste Disposal Plant," Fresno Bee, August 12, 1937; "Site Near City is Planned for Waste Disposal," Fresno Bee, July 21, 1937; Vincenz, "The Sanitary Fill Method of Refuse Disposal," 190-92. Final action on the purchase of the 90-acre plot was delayed for several days by the city commission to consider an alternative disposal option, -a new reduction process-that would extract resalable items from the waste. The process required separation of garbage from other wastes, and Vincenz argued correctly that Fresno residents "would not stand for it." See "Waste Disposal Reduction Plan is Offered City," Fresno Bee, September 10, 1937; "Backers of Waste Disposal Plant Exhibit Process,"

After a few years of operation at the new site a larger capacity dragline with a longer boom was employed, which increased the effectiveness of the operation. The dragline method continued until the late 1960s when self-loading elevating scrapers to move the dirt from the trench to the cover area, were employed. A bulldozer had been added earlier to make the spreading of the waste and its compaction easier. In the 1970s, a large compaction machine was purchased, which helped to extend the life of the facility without requiring major purchases of land. In the last few years of the landfill cover material was imported from other locations. About 1960 the first compactor trucks replaced the open-body collection trucks that brought refuse to the site.[34]

On a visit to Fresno in 1939 to view the landfill, Stanley Pinel, who was conducting a nationwide survey of disposal methods for the American Public Works Association in Chicago, remarked that the Fresno operation was unique and more economical than other methods. However," he stated, the matter of cost and whether the Fresno or a similar method should be used rests to a great extent in the value of the land to be used and its accessibility." In Fresno s case the operation was economical and satisfactory, he added, because the refuse was dumped and filled in a single operation, unlike in other cities where separate steps are taken, which increased costs of disposal. Vincenz was pleased by these comments and those of officials in other cities who were interested in the new method of disposal.[35]

Sanitary landfills in the major cities of San Francisco and New York got more immediate attention than Vincenz's fill in relatively obscure Fresno. San Francisco began its operations in 1932 initially as an emergency measure, and not until 1936 did it operate effectively as a primary disposal option for the city. Storm damage, disagreeable odors, and settling problems plagued the site during the intervening years. Unlike the Fresno fill, San Francisco's was constructed along tidal flats on the bay. The waste was utilized for reclaiming land eventually used for industrial purposes. The farthest edge of the fill created new shoreline as refuse was deposited into the bay at low tide. Such modifications of the shoreline and leaching problems from the fill eventually raised major environmental concerns, but at the time, the practice was regarded as a success.[36]

The New York landfill began in 1936, a year later than Vincenz's experimental fill. Its design was different than the Fresno enterprise, although much larger, and was intended as a land reclamation project not a new disposal prototype. (Both in the case of the New York and San Francisco fills, a primary goal was to create developable land, not to devise a new disposal option per se. The Fresno site is a significant prototype because its primary intent was to create a new disposal option for MSW.) Additionally, the front of the fill was not sealed like the Fresno fill, which made an air-tight seal around the whole area. It was located at Rikers Island, the site of a city prison. Originally a 60-acre island, Rikers had grown to more than 400 acres because of fill

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Fresno Bee, September 11, 1937. See also "New Plan for Garbage Disposal Dropped By City," Fresno Bee, September 20, 1937.

[34]James Martin, "Fresno City Landfill, 1935-1987" (Fresno, CA, n.d.).

[35]"Expert Praises Fresno Plan of Garbage Disposal," Fresno Bee, March 9, 1939; "Vincenz Says Fresno Garbage Disposal Plan Meets Eastern Favor," Fresno Bee, October 23, 1939. See also "Fresno Garbage Fill Given State Health Approval," Fresno Bee, August 19, 1938; "City's Disposal System Approved by Engineers," Fresno Bee, April 22, 1937; "Writer Praises Fresno Garbage Disposal Method," Fresno Bee, June 19, 1937.

[36]"Sanitary-Fill Refuse Disposal at San Francisco," Engineering News-Record 116 (February 27, 1936): 314-17; "Fill Disposal of Refuse Successful in San Francisco," Engineering News-Record 116 (July 6, 1939): 27-28; J. C. Geiger, "Sanitary Fill Method," Civil Engineering 10 (January 1940): 42; John J. Casey, "Disposal of Mixed Refuse by Sanitary Fill Method at San Francisco," Civil Engineering 9 (October 1939): 590-92.

operations dating back to the previous century. Pleased with the sanitary fill project, city officials authorized other sites in the 1930s, with the expectation of reclaiming additional land. Not everyone was happy with the decision. Debate broke out on the degree to which the sites were indeed "sanitary," and political battles arose over the conduct of the Department of Sanitation in carrying out its disposal policy. This turmoil was not sufficient to undermine the practice in the city.[37]

While there was no mass scramble to build sanitary landfills in the 1930s and early 1940s, momentum was slowly shifting in that direction. In Baltimore, for instance, a sanitary landfill was undertaken because of insufficient manpower to run the city's incinerators during the war. The new operation was so successful that the city decided to continue the practice at war's end.[38]

During World War II, the U.S. Army Corps of Engineers experimented with sanitary landfills. In 1941, Jean Vincenz accepted a post as assistant chief of the Repairs and Utilities Division of the Corps of Engineers. The Army needed to develop a disposal method to handle the great variety and amounts of waste at camps and other installations, and, at the same time, was unwilling to utilize critical materials on the building of incinerators. While Vincenz was skeptical about extensive adoption of sanitary fills in the Army without sufficient supervision and adequate equipment, he followed his orders to implement the fills. The Corps of Engineers employed several types of motorized equipment (including the bullclam to compact the earth and the front-end skip loader to move materials) to construct several fills. By 1944, 111 posts were using sanitary landfills to dispose of their refuse. By the end of 1945 almost 100 American cities had adopted the sanitary landfill. This was due in no small part to the recommendation of the United States Public Health Service (USPHS) in 1943 that sanitary fills should be viewed as emergency wartime measures to conserve labor and materials.[39]

The sanitary landfill became a universally accepted disposal option after World War II in the United States. In the 1950s the Sanitary Engineering Division of the American Society of Civil Engineers prepared a manual on sanitary landfilling which became a standard guide. It defined sanitary landfilling as "a method of disposing of refuse on land without creating nuisances or hazards to public health or safety, by utilizing the principles of engineering to confine the refuse to the smallest practical area, to reduce it to the smallest practical volume, and to cover it with a layer of earth at the conclusion of each day's operation, or at such more frequent intervals as may be necessary."[40]

During the 1950s and 1960s the prevailing wisdom among those involved in solid waste management was that sanitary landfilling was the most economical form of disposal, and at the same time, sometimes offered a method which produced reclaimed land. Finally, in the 1970s, solid waste professionals and others began to

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[37]"Sanitary Landfill and the Decline of Recycling as a Solid Waste Management Strategy in American Cities," 22-25; Vincenz, "The Sanitary Fill Method of Refuse Disposal," 199. See also Desmond P. Tynan, "Modern Garbage Disposal," American City 54 (June 1939): 100-0; Rolf Eliassen and Albert J. Lizee, "Sanitary Land Fills in New York City," Civil Engineering 12 (September 1942): 483-86.

[38]W. Rayner Straus, "Use of Sanitary Fill in Baltimore to Continue After the War," American City 60 (January 1945): 82-83.

[39]"An Interview with Jean Vincenz, 17-19; Vincenz, "Refuse Disposal by the Sanitary Fill Method," 88-89; Melosi, "Historic Development of Sanitary Landfills and Subtitle D," 20; ------- Municipal Refuse Disposal, --------, 91-92. See also "Sanitary Fill for Montgomery County," American City 60 (April 1945): 15.

[40]Melosi, "Historic Development of Sanitary Landfills and Subtitle D," 20.

doubt the adequacy of the sanitary landfill exclusively to serve the future disposal needs of cities. The major point of discussion was the problem in acquiring adequate space. Ironically, the thing that made sanitary landfills attractive as a disposal option--availability of cheap and abundant land--was the very argument turned on its head in the 1970s to criticize it. Siting new landfills became problematic in some parts of the country, especially in the Northeast. Many communities simply did not set aside land specifically designated for waste disposal facilities. Availability of land was only the most obvious point of contention. Landfill siting is treacherous business because of citizen resistance and increasingly rigid environmental standards. A great deal has been made of the NIMBY syndrome--Not in My Back Yard--which reveals growing skepticism with the environmental soundness of landfills, especially those that were unlined (with the potential to leach toxic materials into groundwater) and/or made no provisions for monitoring methane gases building up in the landfill. Equally important, NIMBY has received wider press coverage because of attempts to site landfills beyond the inner-city along the urban fringe, where the population is not characteristically poor. But despite its growing problems in the 1970s and after, the sanitary landfill was clearly a pioneering disposal option in the United States, possibly the most significant and universally adopted disposal technology yet developed.[41]

The Fresno Sanitary Landfill is an important historical site because it established the prototype for the modern sanitary landfill in the United States, particularly in the developmental stages of that technology from 1937 to 1950. Vincenz's design, incorporating the trench method, layering of waste and dirt, and the daily covering of the fill area introduced a method of disposal that for its time provided a systematic and hygienic method of disposal through the use of the best technology available. No other solid waste disposal option was as widely utilized in the United States and elsewhere as the sanitary landfill. And although the method has drawn criticism is recent years, there is not likely to be a single disposal option developed for many years that will attain such universal acceptance and use.

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[41]Ibid., 20-24.

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Previous documentation on file (NPS):

__ Preliminary Determination of Individual Listing (36 CFR 67) has been requested.
__ Previously Listed in the National Register.
__ Previously Determined Eligible by the National Register.
__ Designated a National Historic Landmark.
__ Recorded by Historic American Buildings Survey: #
__ Recorded by Historic American Engineering Record: #

Primary Location of Additional Data:

__ State Historic Preservation Office
__ Other State Agency
__ Federal Agency
__ Local Government
__ University
_X_ Other (Specify Repository): Engineering Journals

10. GEOGRAPHICAL DATA

Acreage of Property: Approximately 140 acres

UTM References:

	Zone	Easting	Northing
A:	11	247540	4065580
B:	11	247510	4064670
C:	11	247110	4064670
D:	11	247120	4065580

Verbal Boundary Description:
The nominated resource is a large mound, rectangular in plan, situated near the southwest corner of West and Jensen Avenues. More specifically, the northeast corner of the mound begins at a point 220 feet south of Jensen Avenue, and 100 feet west of West Avenue. The NHL boundary follows the perimeter of the elevated mound 4350 feet southward in a slightly irregular line, generally 50 to 100 feet west of West Avenue. The distinct contour line then turns west for 120 feet, then north in a slightly irregular line for 4300 feet. The proposed NHL boundary turns east, at a point 300 feet south of Jensen Avenue, running in a slightly irregular line for 1200 feet until returning to the point of origin.

Boundary Justification:
The nominated resource is the sanitary landfill "structure" begun in 1937 and increased in size as its operational life continued (based on the original expandable design) until 1987. The nominated resource boundary is confined to the man-made mound that is clearly discernable due to the obvious rise in elevation on an otherwise flat terrain.

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